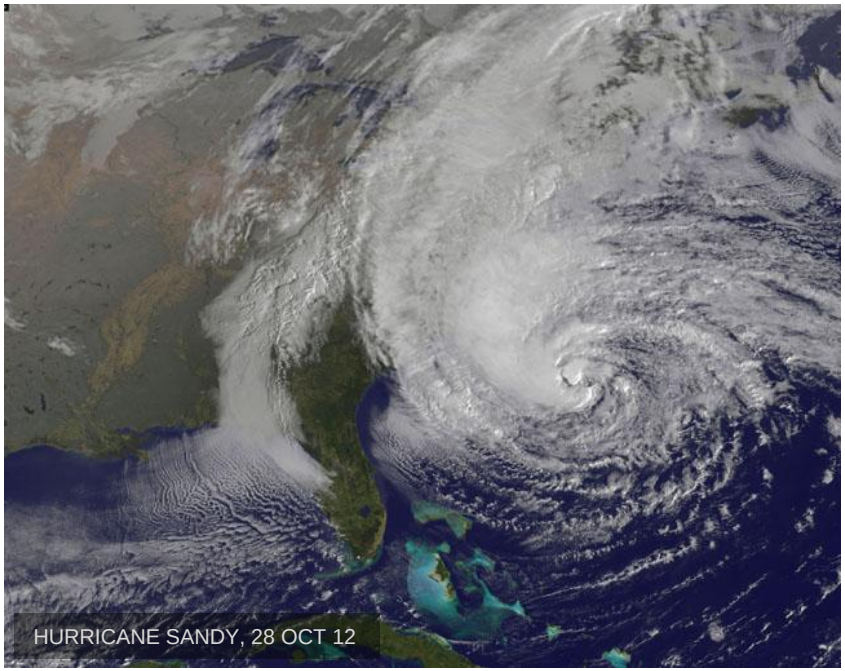
Hurricane Awareness



Force Oceanographer, N333
May 2013

The Record Book

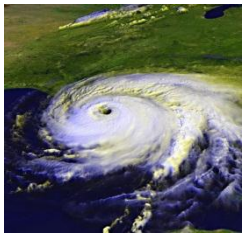
Atlantic Basin

Costliest:	Hurricane SANDY 2012 ($108 B)
Deadliest:	Galveston Hurricane 1900 (~8000 deaths)
Highest Activity:	2005 (28 Storms, 15 Hurricanes, 7 Major)
Max Strikes:	1886 (7 U.S. Landfall Events)
Earliest Formation:	7 March 1908 (unnamed)
Latest Formation:	December 31, 1954 (ALICE)
Highest Surge:	Hurricane KATRINA 2005 (27.8 ft)
Highest Winds:	Hurricane CAMILLE 1969 (165 KTS)

Blake et al., 2011

Overview

- *Quick Reference Guide*
- *Tropical Cyclone 101*
- *2013 Pre-Season Forecast*
- *Official Warning Products*
- *Hampton Roads Flood Maps*
- *Emergency Supply Kit*
- *Resources*



Tropical Cyclone *Quick Reference Guide 2013*

Fleet Weather Center - Norfolk, 9141 Third Ave, Norfolk VA 23511-2394
Operations Watchfloor: 757-444-7750 (DSN 564-7750)
NIPR email: fwc-norfolk.cdo@navy.mil SIPR email fwc-norfolk.cdo@navy.smil.mil
(Public) http://www.usno.navy.mil/NOOC/fwc-n (PKI) https://nepoc.oceanography.navy.mil/portal/web/fwcn
(SIPR) http://nepoc.oceanography.navy.smil.mil/portal/web/fwcn

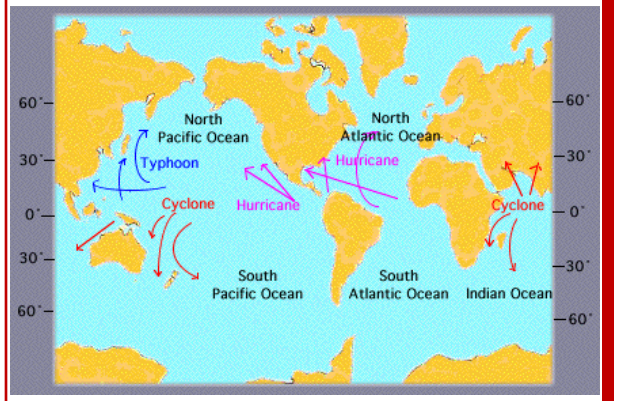
Atlantic **Tropical Cyclone Season: 01 June - 30 November**

East Pacific **Tropical Cyclone Season: 15 May - 30 November**

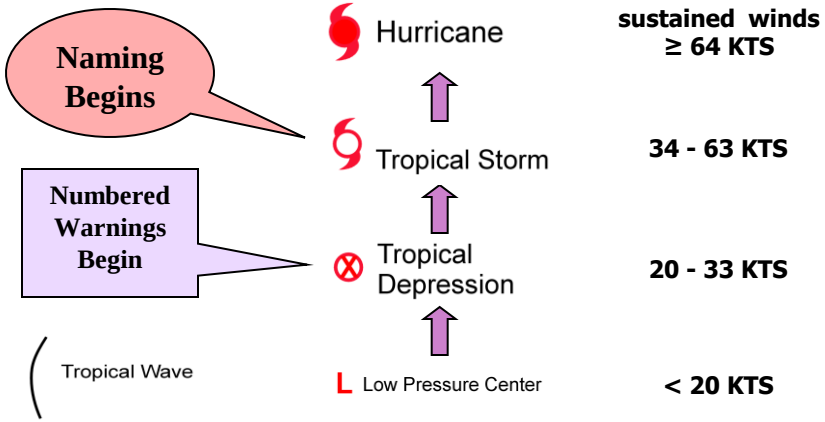
2013 Atlantic Tropical Cyclone Names

Andrea	Karen
Barry	Lorenzo
Chantal	Melissa
Dorian	Nestor
Erin	Olga
Fernand	Pablo
Gabrielle	Rebekah
Humberto	Sebastien
Ingrid	Tanya
Jerry	Van
	Wendy

Tropical Cyclones: Development Areas and Movement



Stages of Tropical Cyclone Development



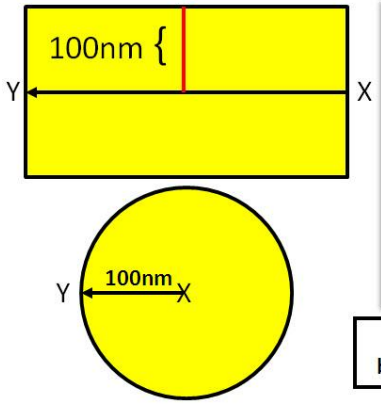
Saffir-Simpson Scale - *Hurricane Destruction Potential*

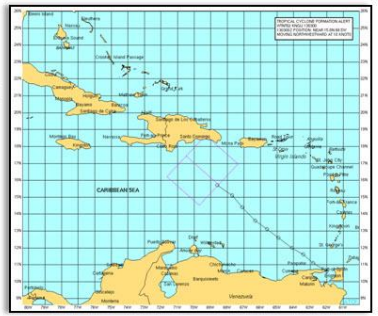
Category	Sustained Wind Speed (knots)	(mph)	Damage
1	64 - 82	74 - 95	Minimal
2	83 - 95	96 - 110	Moderate
3	96 - 112	111 - 129	Extensive
4	113 - 136	130 – 156	Extreme
5	> 137	> 157	Catastrophic

NOTE: Categories 3, 4, & 5 are considered **MAJOR** hurricanes

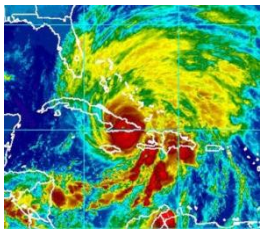
Tropical Cyclone Formation Alert (TCFA)

TCFAs provide early notification of likely TC development to the Fleet and help minimize the number of OTSR Advisories and Diverts





Tropical cyclone formation possible between positions X and Y within 24 hrs



Tropical Cyclone *Quick Reference Guide 2013*

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(Public) http://www.usno.navy.mil/NOOC/fwc-n (PKI) https://nepoc.oceanography.navy.mil/portal/web/fwcn
(SIPR) http://nepoc.oceanography.navy.smil.mil/portal/web/fwcn

Tropical Cyclone Conditions of Readiness (TC-CORs)

(time until the forecast onset of destructive winds)*

COR V	**96** hours
COR IV	**72** hours
COR III	**48** hours
COR II	**24** hours
COR I	**12** hours

* Destructive winds are defined as sustained winds ≥ **50 KTS**

Fleet Sortie Conditions

Charlie - Prepare to sortie within **48** hours
Bravo - Expected sortie within **24** hours
Alpha - Commence sortie to sea

Aircraft Evacuation Status Reports

(required at the following times)

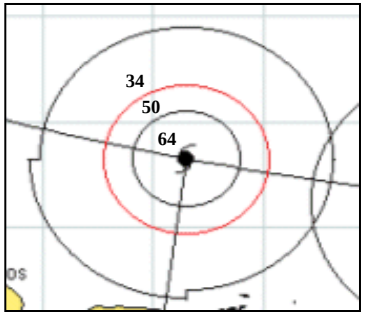
72 hours
48 hours
24 hours
12 hours

Environmental Requirements for Tropical Cyclone Development

- **Sea Surface Temperature > 26 C (78 F)** with sufficient depth (approx 200ft) of warm water
- **Pre-existing disturbance** to trigger thunderstorm activity (frontal boundary, easterly wave, distal low pressure, etc…)
- **Divergence** at the upper levels (above the 400 mb level or about 24,000ft)
- **Coriolis Force** (Ample Planetary Vorticity) will generally be sufficient at latitudes poleward of 5 degrees North/South
- **Weak (< 20kts) vertical wind shear** between the surface and upper troposphere
- Relatively **moist layers at the mid-levels** (about the 700mb level / 10,000 ft)
- System embedded in a potentially **unstable air mass**

KEY TO TROPICAL CYCLONE WARNING GRAPHICS

The **black** and **red** lines around a projected tropical cyclone track indicate the **34-knot, 50-knot, and 64-knot wind radii** associated with the storm at a given point. The outermost black line indicates the **34-knot** radius; the red line indicates the **50-knot** radius; and the inner black line shows the **64-knot** radius. Not all tropical cyclones will have peak central winds that reach the **50-knot** or **64-knot** threshold; as a result, weaker storms may not have a **50-knot** or **64-knot** wind radius. The size of the storm's forecast wind field will be indicated by the radius of each quadrant in the associated tropical cyclone warning message.



NFAAS | NAVY FAMILY ACCOUNTABILITY and ASSESSMENT SYSTEM

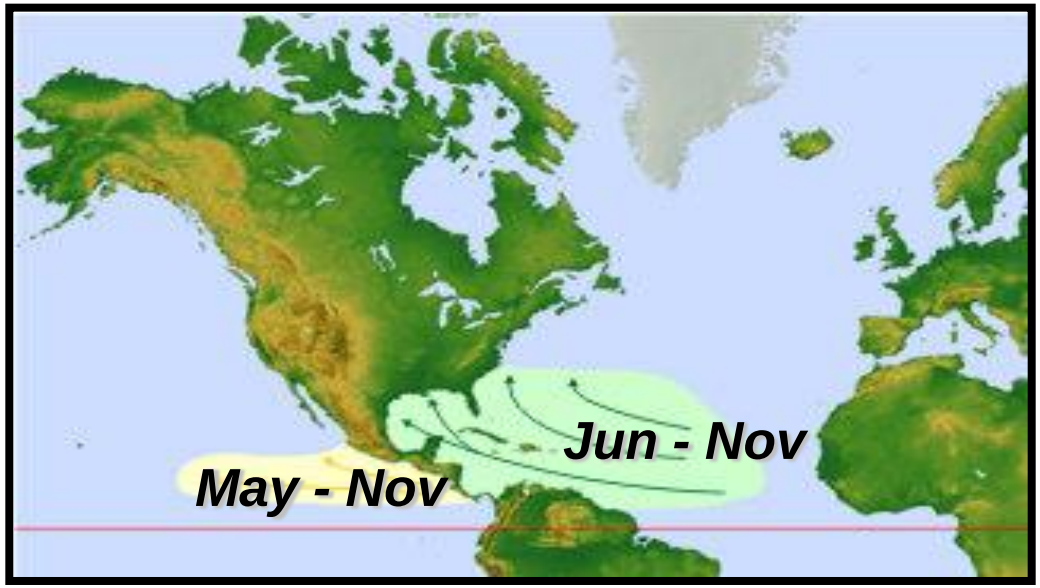
NFAAS standardizes a method for the Navy to account, assess, manage, and monitor the recovery process for personnel and their families affected and/or scattered by a wide-spread catastrophic event. The NFAAS provides valuable information to all levels of the Navy chain of command, allowing commanders to make strategic decisions which facilitate a return to stability.

NFAAS allows Navy Personnel to do the following:
- Update Contact/Location information
- Complete Needs Assessment
- View Reference Information

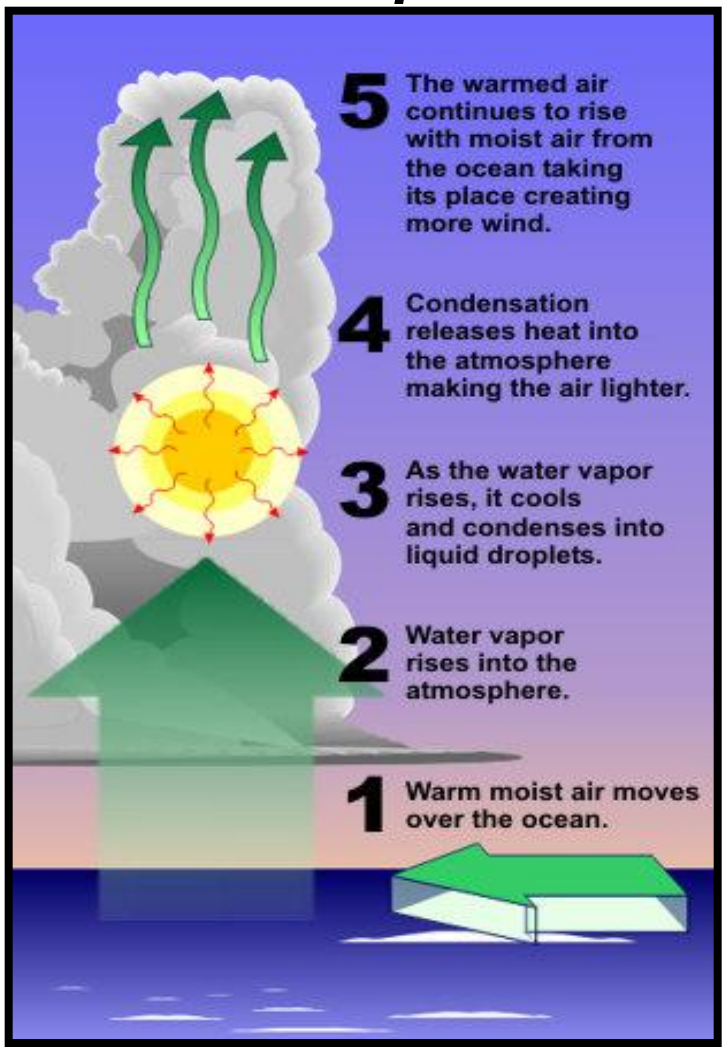
NFAAS Website --- https://www.navyfamily.navy.m

Tropical Cyclone 101 (Development)

Formation Basins



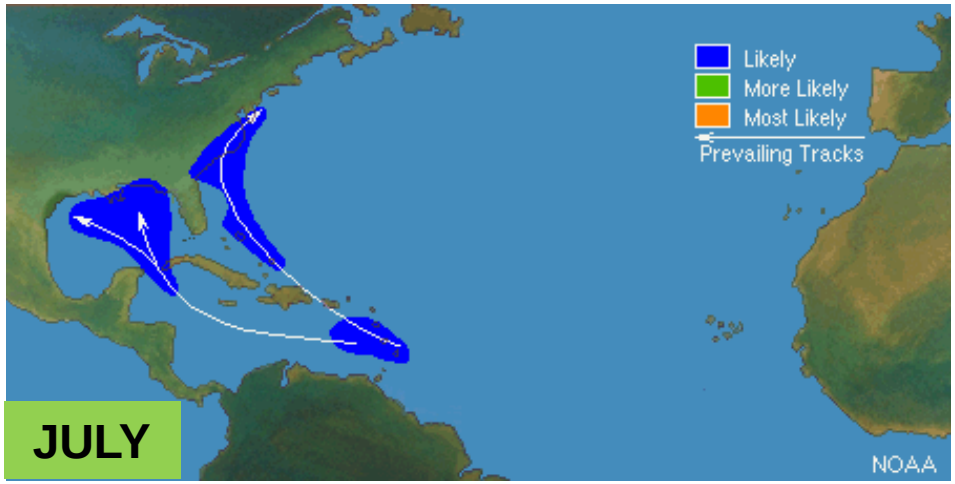
Development

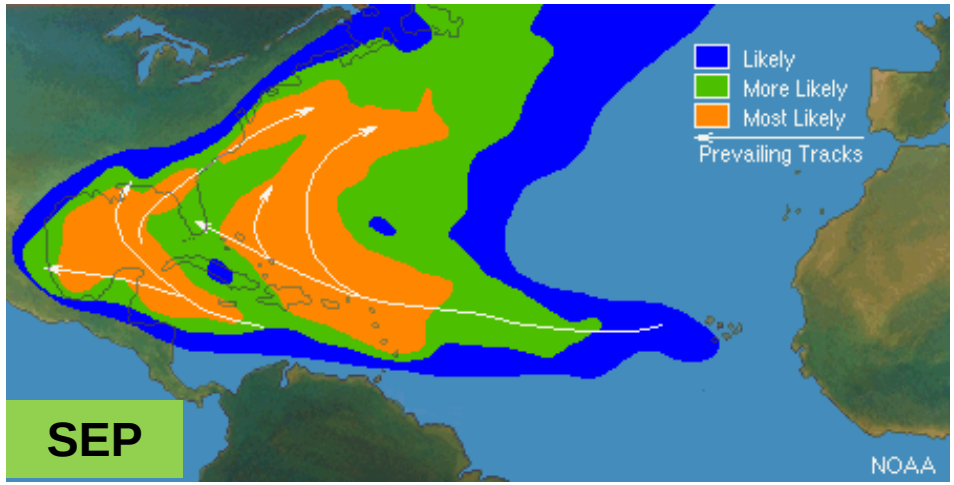


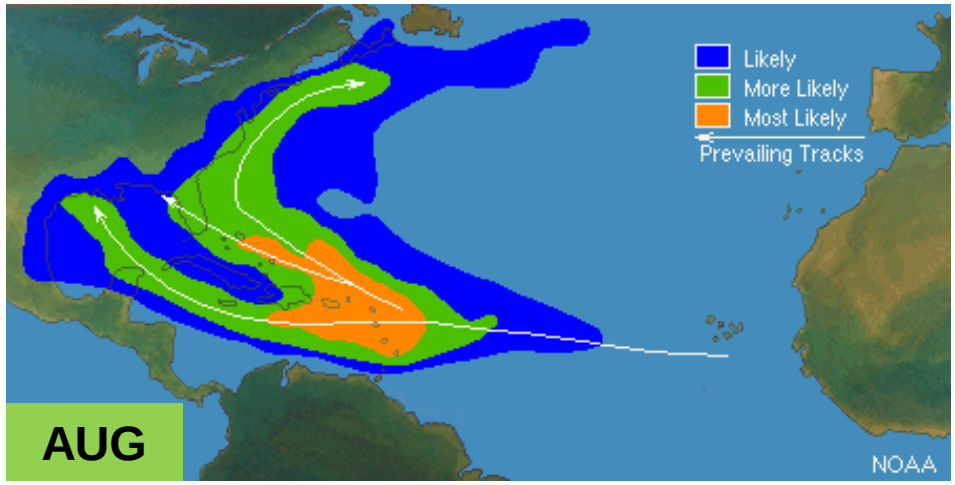
Favorable Conditions

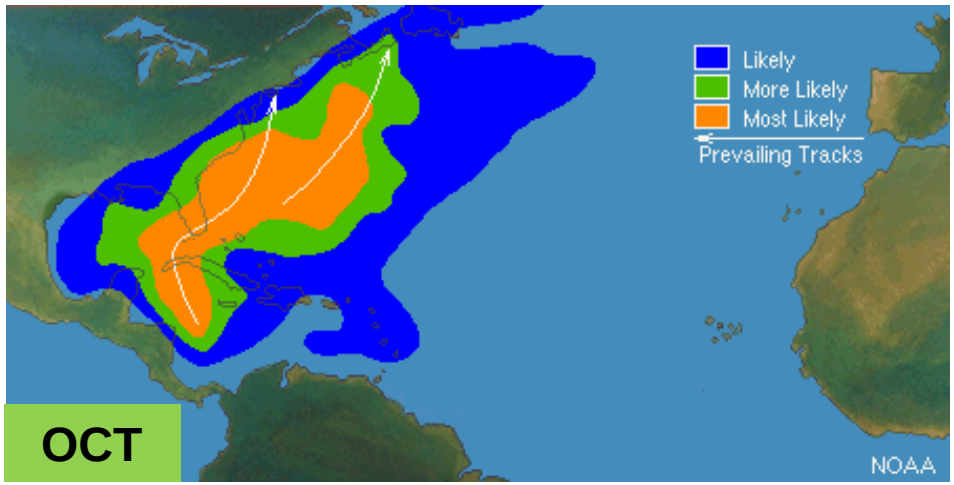
- *Warm water (>78ºF) to 200 ft depth*
- *Conditionally unstable atmosphere*
- *Moist air ~ SFC to 16,000 ft*
- *300nm or more from Equator (~5° N or S)*
- *Pre-existing disturbance*
- *Low vertical wind shear*
- *Divergence Aloft*

Tropical Cyclone 101
(Formation Areas and Tracks)









Average Hurricane Return Period (> 64 kts within 50 NM)

Kings Bay Area: 11 yrs Hampton Roads Area: 13 yrs New London: 17 yrs

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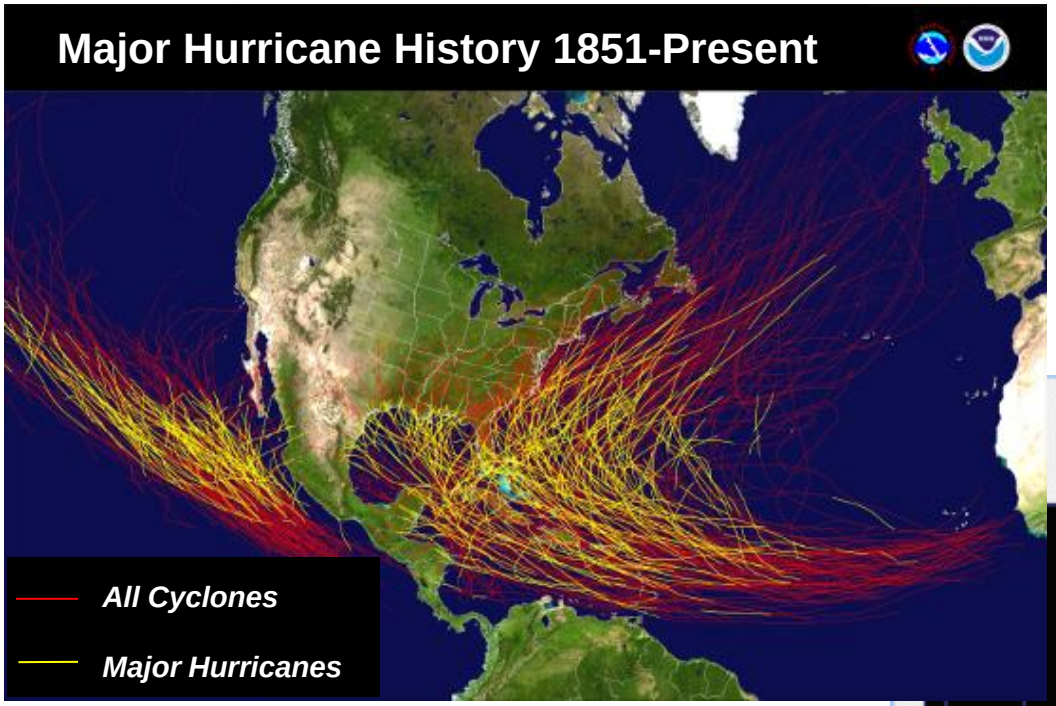
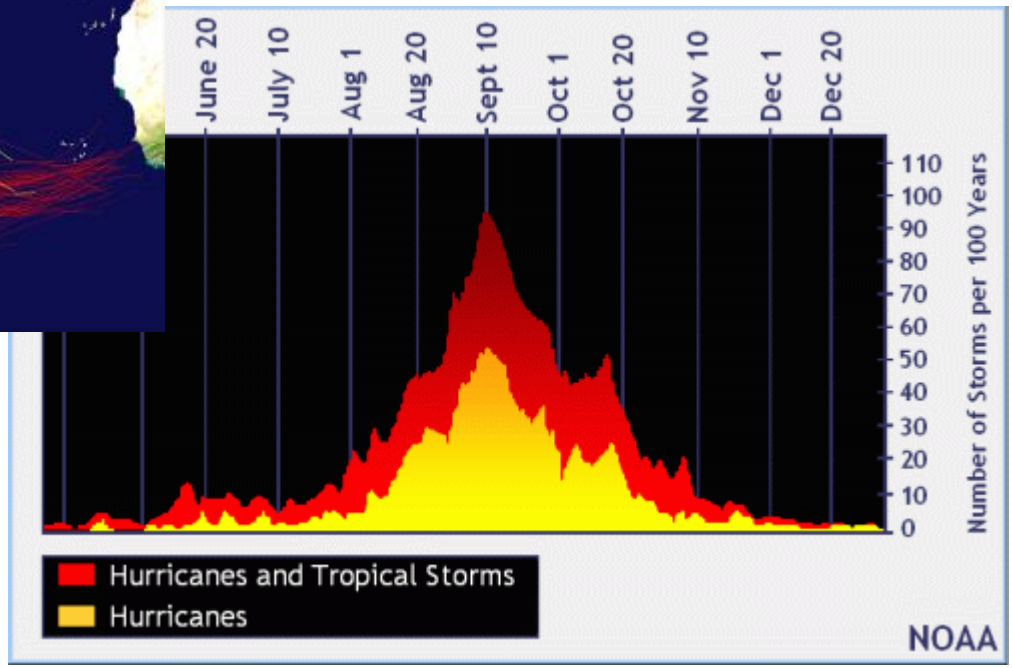
Tropical Cyclone 101
(Atlantic Basin Tracks / Frequency)



Major Hurricanes can strike anywhere along the East Coast and Gulf Coast of the U.S.



Hurricane Season is from 1 June – 30 November (Peak: August – October)

A Look Ahead: 2013 Preseason Forecast

ATLANTIC BASIN SEASONAL HURRICANE FORECAST FOR 2013

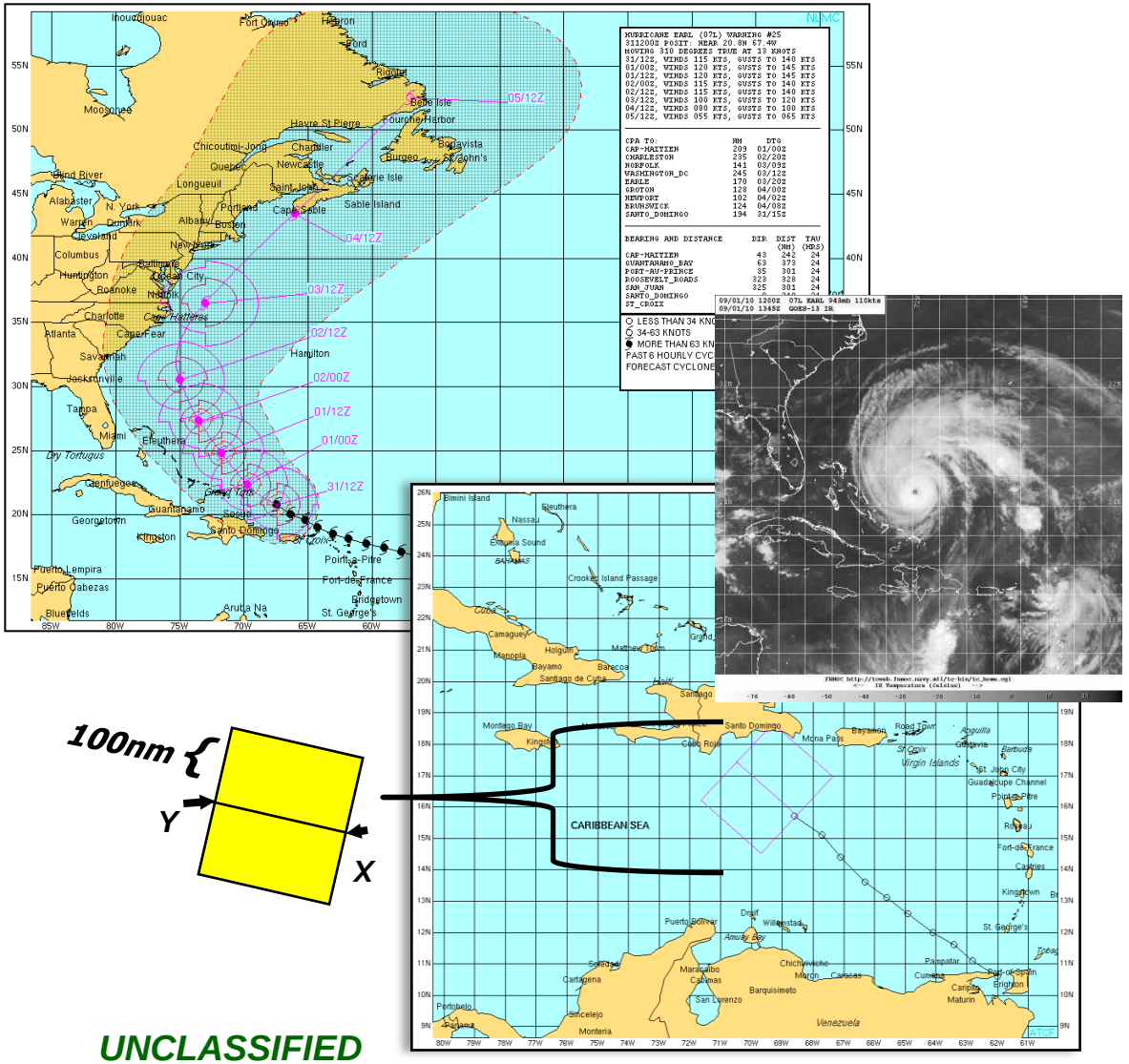
Forecast Parameter and 1981-2010 Median (in parentheses)	Issue Date 10 April 2013
Named Storms (NS) (12.0)	18
Named Storm Days (NSD) (60.1)	95
Hurricanes (H) (6.5)	9
Hurricane Days (HD) (21.3)	40
Major Hurricanes (MH) (2.0)	4
Major Hurricane Days (MHD) (3.9)	9
Accumulated Cyclone Energy (ACE) (92)	165
Net Tropical Cyclone Activity (NTC) (103%)	175

Klotzbach and Gray, 2013

Above-average hurricane activity expected in the Atlantic basin this year

FWC-N Tropical Cyclone (TC) Warnings

- ***TCFA Alerts***
  - ***Formation area that is favorable for TC development***
  - ***TC genesis expected in next 24 hours***
- ***TC Warnings***
  - ***Updated every 6 hours***
  - ***Text & graphic***
  - ***5 day track / intensity forecast***
  - ***35/50/64 kt wind fields***
  - ***CPA to key ports***



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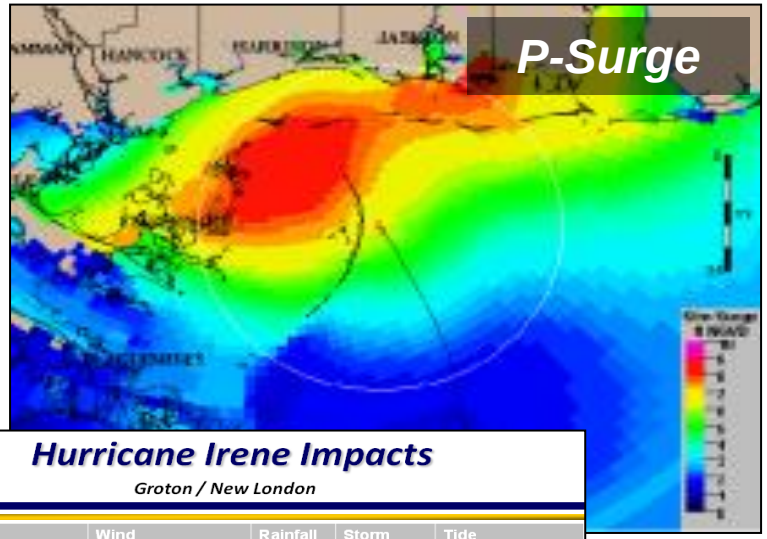
METOC SUPPORT PRODUCTS

- **Destructive Winds Forecast (DWF)**
  - Text product designed for CNIC
  - USN installations of interest
  - Forecast installation maximum sustained winds
  - Provides TC-COR and Sortie recommendations
- **Storm Surge**
  - 48 hr forecast only
  - NHC Official forecast via P-surge
  - Available for coastal regions within a hurricane warning area
- **Tailored Impacts**
  - Adds fidelity to the tropical DWF
  - Produced for areas where acute impacts are expected



Hurricane Irene Impacts

Groton / New London

NOT FOR PUBLIC RELEASE

Time Period (local time dd/hh)		Wind (knots)	Rainfall (inches)	Storm Surge (ft) *	Tide (local time / ft)
28/02L – 28/08L	Sct SVR T-storms	E 35 – 40 G 45	2 – 3	¾ – 1 ¼	0323 / - 0.1
28/08L – 28/14L	Sct SVR T-storms	SE 40 – 45 G 55	2 – 3	2 – 4	0909 / 3.1
28/14L – 28/20L	Heavy Rain	WSW 35-45 G 50	1 – 2	¾ – 1 ¼	1537 / 0.0
28/20L – 29/02L	Sct Rainshowers	WNW 30 – 35 G 40	¼ - ½	½ – 1	2129 / 3.4
29/02L – 29/08L	NIL	W 20 – 25G 30	NIL	NIL	0407 / - 0.2
29/08L – 29/14L	NIL	W 10 – 15 G 20	NIL	NIL	0954 / 3.3
29/14L – 29/20L	NIL	VRB 05 - 10	NIL	NIL	1627 / - 0.1

As of 28/0200L, the center of Hurricane Irene was located near 38.1N 75.0W moving NNE at 15kts. CPA to GROTON is 63 NM at 28/0200L based on WARNING NUMBER 32.

Total rainfall from Irene is expected to be 5 to 10 inches., with isolated areas of 15 inches possible.

•Storm surge + tide = storm tide MAX Storm Tide= 5 - 7 ft

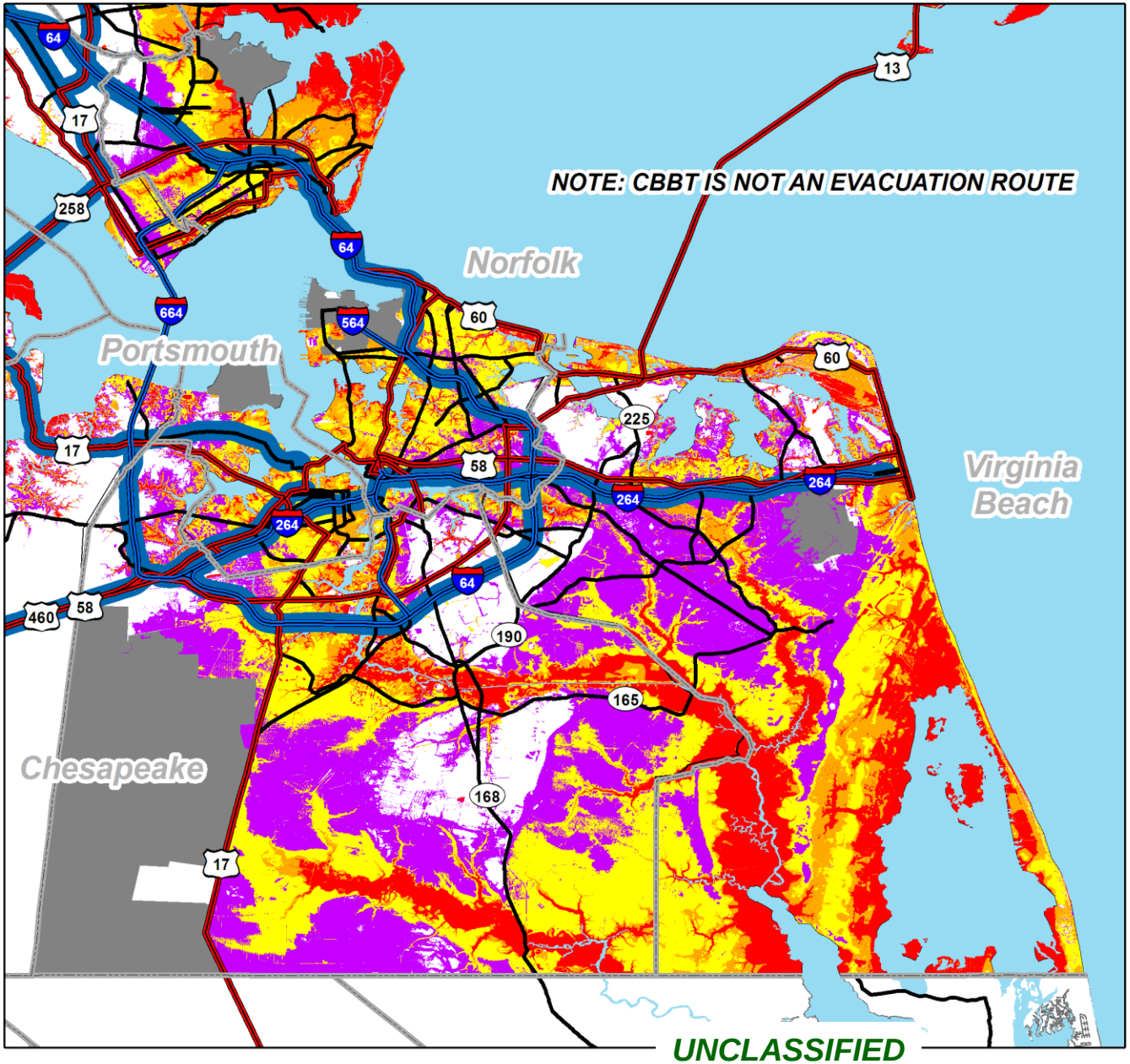
Updated: 28/02L Released by: LTJG C. B. Cupp

Fleet Weather Center - Norfolk

Hampton Roads Flood Maps / Evacuation Routes

Shaded regions indicated flood inundation areas for given category storms

2008 Virginia Hurricane Evacuation Study



Southside - East Storm Surge Inundation Map

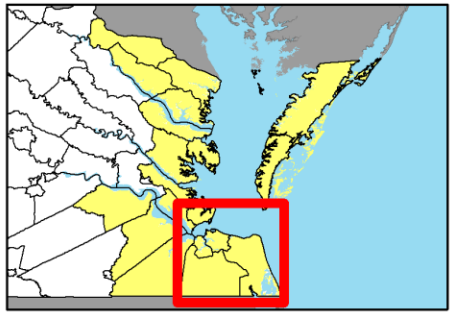
- Category 1
- Category 2
- Category 3
- Category 4
- Not In Study
- Evacuation Routes

N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 2 4 6 8
Miles



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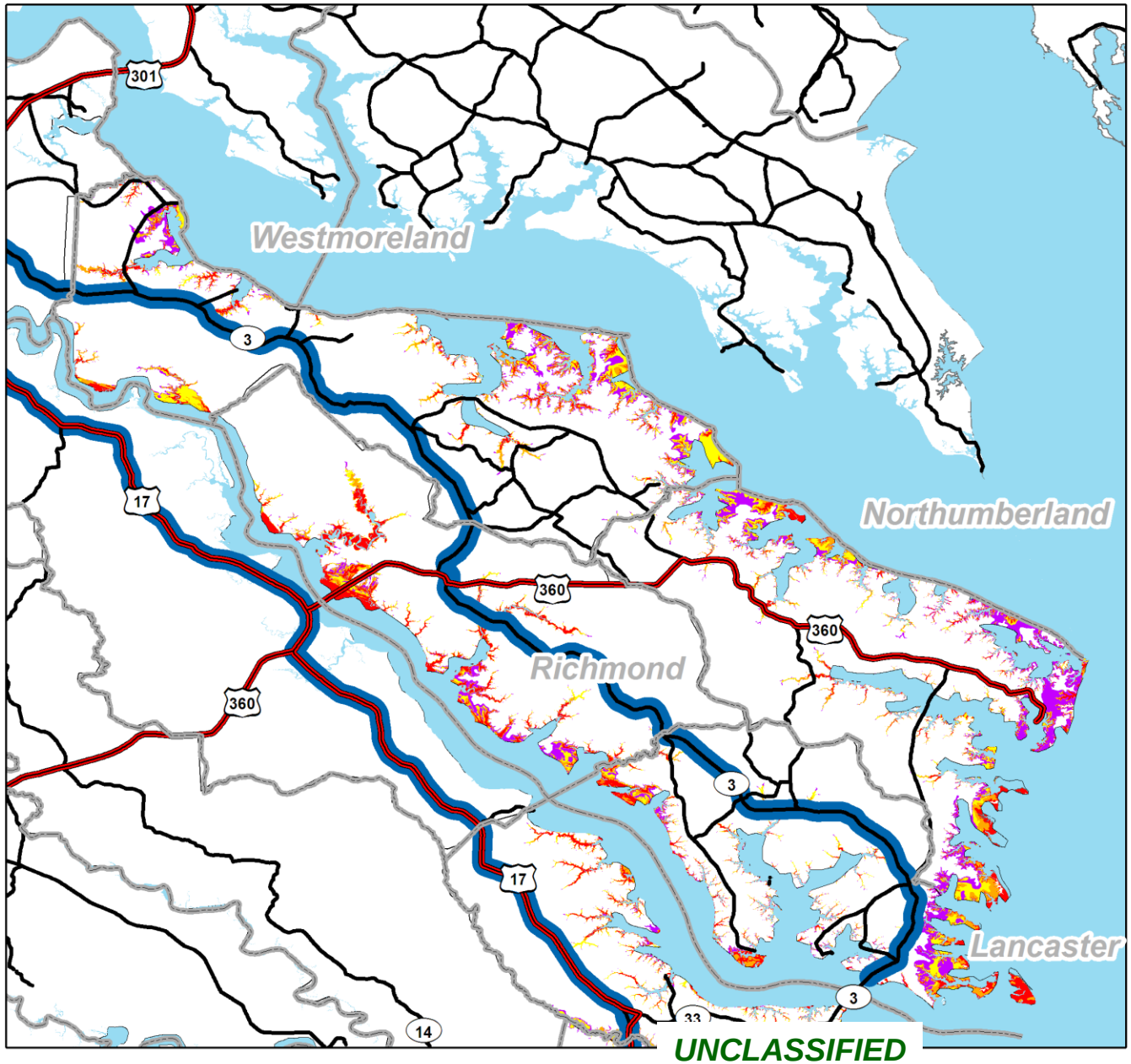
2008 Virginia Hurricane Evacuation Study



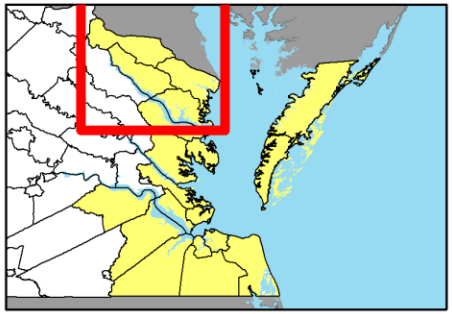
Northern Neck Storm Surge Inundation Map

Category 1
Category 2
Category 3
Category 4
Not In Study
Evacuation Routes
N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 3 6 9 12
Miles



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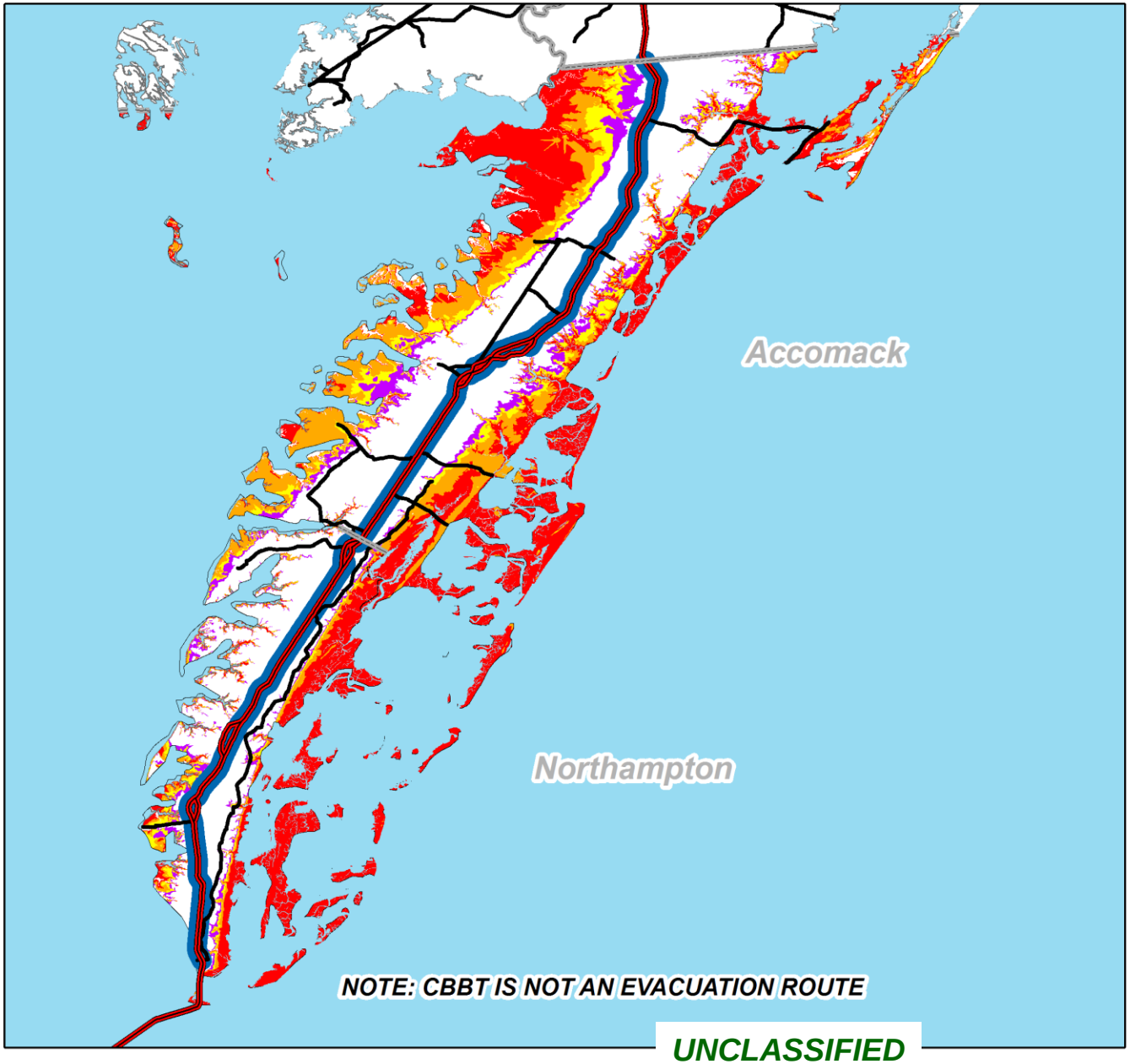
2008 Virginia Hurricane Evacuation Study



Eastern Shore Storm Surge Inundation Map

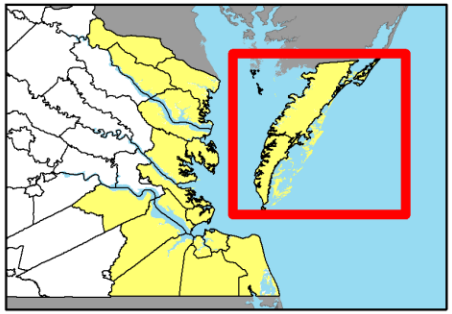
- Category 1
- Category 2
- Category 3
- Category 4
- Not In Study
- Evacuation Routes

N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 3 6 9 12
Miles



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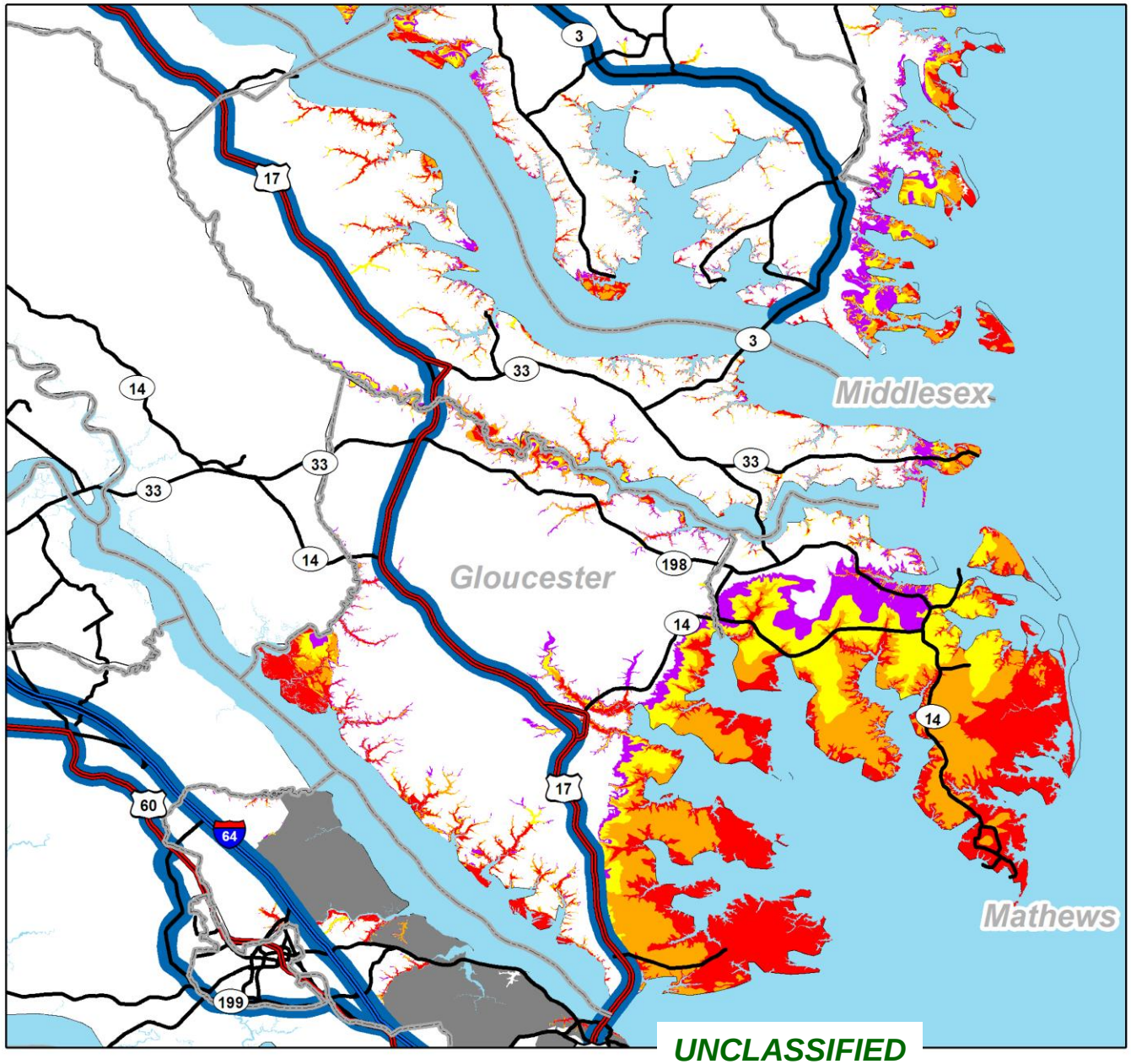
2008 Virginia Hurricane Evacuation Study



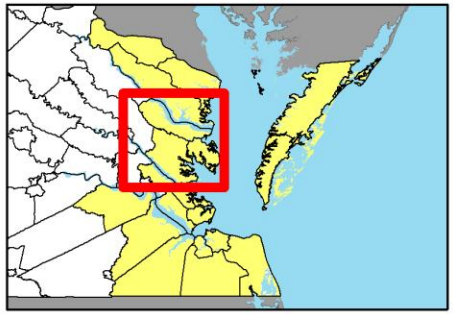
Middle Peninsula Storm Surge Inundation Map

Category 1
Category 2
Category 3
Category 4
Not In Study
Evacuation Routes
N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 2 4 6 8
Miles



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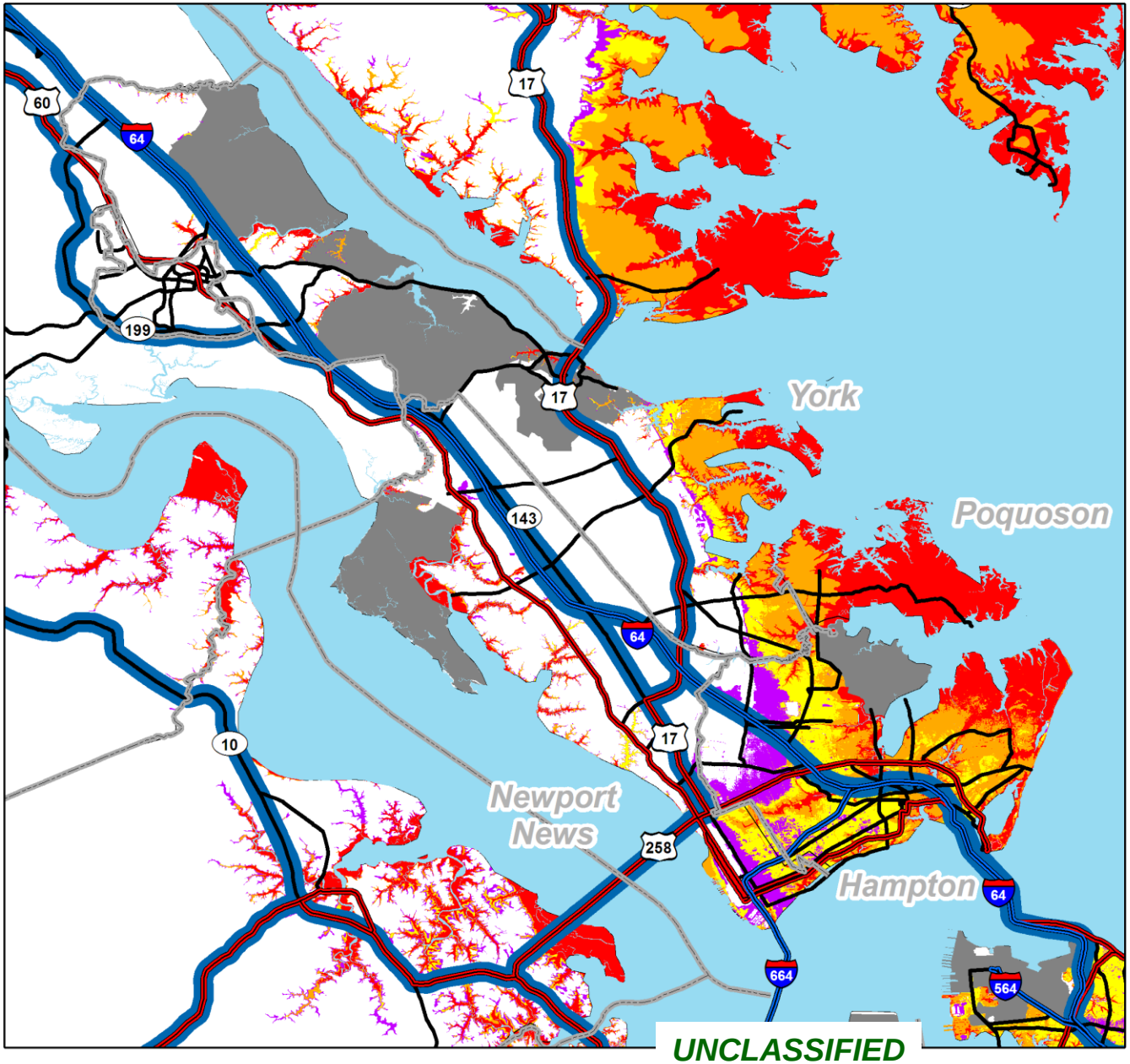
2008 Virginia Hurricane Evacuation Study



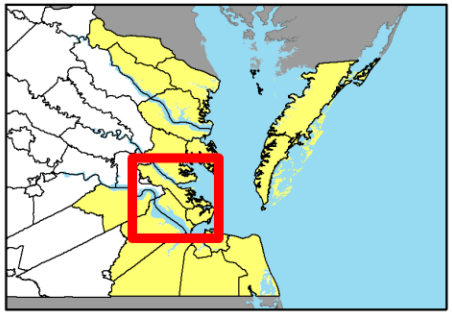
Peninsula Storm Surge Inundation Map

Category 1
Category 2
Category 3
Category 4
Not In Study
Evacuation Routes
N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 2 4 6 8
Miles



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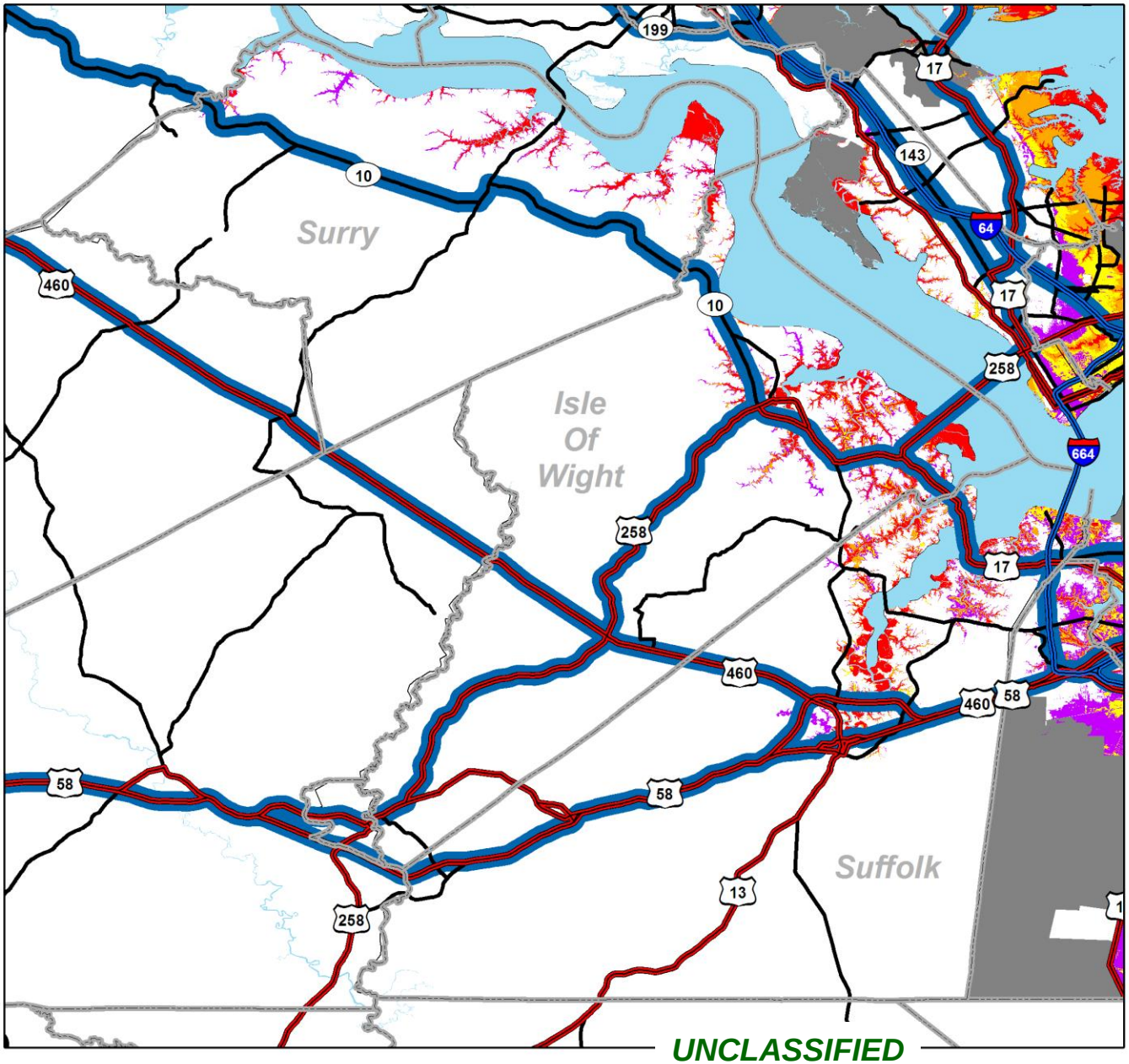
2008 Virginia Hurricane Evacuation Study



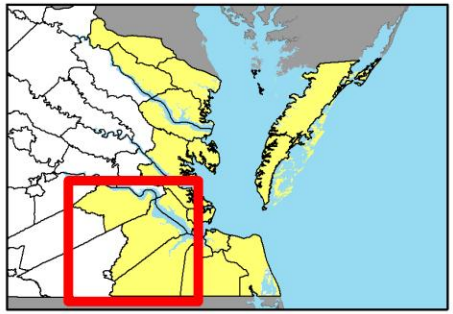
Southside - West Storm Surge Inundation Map

Category 1
Category 2
Category 3
Category 4
Not In Study
Evacuation Routes
N

VIRGINIA DEPARTMENT OF EMERGENCY MANAGEMENT

HURRICANE EVACUATION ROUTE

0 2.5 5 7.5 10
Miles



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Emergency Supply Kit Essentials

Necessary

- Water: 1 gallon per person per day for at least three days
- Food: nonperishable food to for at least three days (Include canned goods with low salt and high liquid content.)
- Manual can opener
- First aid kit
- Prescription medications: enough for at least three days
- Dust masks or cotton t-shirts for every member of the household
- Personal sanitation supplies
- Flashlight: one flashlight for every two people in the household
- Battery-powered or hand-crank radio all-hazards NOAA weather radio
- Extra batteries: for flashlights, radios, and other items in kit
- Money: At least $100 in small denomination bills
- Wrench or pliers for turning off utilities
- Local maps and your family emergency plan
- Your command muster information
- Important personal and financial documents: stored in waterproof container

Additional

- Infant formula: enough for at least three days
- Diapers: enough for at least three days
- Food and water for your pet
- Items for individuals with special needs
- Paper plates, paper cups, plastic utensils, paper towels
- Disinfectant
- Matches in a waterproof container
- Whistle to signal for help
- Sturdy shoes
- Hats and gloves
- Sleeping bag or other weather-appropriate bedding
- A weather-appropriate change of clothes
- Coats, jackets, and rain gear
- Fire extinguisher
- Paper and pencil
- Books, games, puzzles, toys, and other activities for children

Official U.S. Navy Warnings

- *Public Facing Portal*
  - *Hosted by U.S. Naval Observatory*
  - *Unrestricted access from any internet-capable device*
  - *http://www.usno.navy.mil/NOOC/fwc-n*
- *Naval Enterprise Portal – Oceanography (NEP-Oc)*
  - *Restricted PKI access*
  - *Full access to all FWC-N UNCLAS products*
  - *https://nepoc.oceanography.navy.mil/portal/web/fwc-n/welcome*
  - *DWF available at https://pki.weather.navy.mil/DWF/*
- *SIPR Naval Enterprise Portal – Oceanography (NEP-Oc)*
  - *SIPR connectivity required*
  - *Full access to all FWC-N products*
  - *GWEAX/OTSR products*
  - *http://nepoc.oceanography.navy.smil.mil/opensso/UI/Login?goto=http://nepoc.oceanography.navy.smil.mil/portal/web/fwc-n/welcome*

Public Resources

- ***Ready Navy – Disaster Preparedness Website***
  - ***http://www.ready.navy.mil/***
- ***Federal Ready Campaign***
  - ***http://www.ready.gov/***
- ***Ready Virginia – Emergency Management Website***
  - ***http://www.vaemergency.gov/readyvirginia***
- ***Ready Georgia – Emergency Management Website***
  - ***http://www.ready.ga.gov/***
- ***Connecticut Emergency Management Website***
  - ***http://www.ct.gov/demhs/site/default.asp***